may obtain the prize; he must dig and drain and enrich the soil, must plant, protect and prune, and, like the husbandman, he must have long patience before the harvest comes. He must be prepared for failures and disappointments, for nipping frosts and scorching suns, hailstones and drenching rains, for blight and mildew, fungus and thrip, for aphis and grubs, spiders and beetles, suckers and weeds. The obstacles are many, and the enemies are fierce, as ever to those who would attain excellence.

But perseverance will prevail, and he who has an expert for his guide will reach the summit, however steep may be the mountain. He who has a productive soil, a situation sheltered but not overshadowed, an atmosphere not polluted by smoke or smut, who adds to these inseparable adjuncts of success a determination to succeed, and then follows, in strict obedience, the teaching of Mr. Foster-Melliar, will repeat his achievements; the pupil will become a professor, and the entered apprentice will be a master-mason.

On the subject of "garden roses," roses which have not the perfect symmetry and fulness required for exhibition at our shows, the author declares that he is no authority, and he tells us little or nothing of their infinite variety and beauty in beds, borders and shrubberies, on pillars, pergolas and walls; but as a manual for the production of those roses, which have been most admired by rosarians, in their loveliest form, his admirable essay is complete.

OUR BOOK SHELF.

The Birds of North and Middle America. Part i. "The Fringillidæ." By R. Ridgway. *Bulletin* U.S. Museum, No. 50. Pp. 715; 20 plates. (Washington, 1901.)

MR. RIDGWAY is such a well-known authority on the birds of North America that anything coming from his pen is sure to obtain a welcome at the hands of his brother ornithologists. The size of the present volume, which, as stated in its title, deals only with a single family, affords an index of the bulk and extent of the work of which it forms the commencement. The amount of labour involved in such a task is enormous and can only be properly appreciated by working naturalists. Preparations for the work, the author tells us, have been in more or less active progress for the last twenty years, and so long ago as the autumn of 1894 the task of putting together in proper form for press the vast accumulation of material was taken in hand. The labour of measuring specimens of more than 3000 forms of birds and making the necessary references to previous descriptions was, however, so vast that it has only been possible to issue the first part after this long lapse of time. It is hoped, now that much of the drudgery is accomplished, future progress may be more rapid.

The object of the work is to describe in detail every definable form of bird—whether species or subspecies—met with on the American continent, from the Arctic districts to the eastern end of the Isthmus of Panama, together with the West Indian and Galapagos Islands. Moreover, besides the indigenous denizens of the area, the accidental or casual visitors, as well as artificially introduced species, are included, so that the list is as full and comprehensive as possible. Needless to say, the work is written on modern American lines, so that the number of forms regarded as entitled to distinction is very great; while the number of genera and subgenera is likewise unusually large. An especial feature of the work is the large number of forms which are relegated to the rank of subspecies.

As regards the description and keys to the different groups and species, the work appears to be admirably written, the number of specimens of which the measurements are given rendering it especially valuable. Perhaps it was somewhat unnecessary to give a general account of birds and their various orders, but this is a fault on the right side, and the work should prove invaluable to all zoologists on both sides of the Atlantic. In replacing the name "Central America" by the unfamiliar "Middle America" the author may be etymologically right, but if this be the reason of the innovation, it is somewhat curious to find such a change advocated by American naturalists, who are notorious for the contempt with which they treat the synthesis and orthography of scientific names. R. L.

The Lens. A Practical Guide to the Choice, Use and Testing of Photographic Objectives. By T. Bolas, F.C.S., F.I.C., and George E. Brown, F.I.C. Pp. vi + 176. (London: Dawbarn and Ward, Ltd., 1902.) Price 2*s.* 6*d.* net.

THIS is a useful book, not only for beginners in the use of the camera, but for many photographic workers who have never studied the optics of lenses. The elementary treatment of lenses is far in advance of that of most professed English text-books of optics, as from the outset it does not make the assumption of an infinite thinness of lenses, but treats them by the method of Gauss by means of principal planes and principal points. Unfortunately, the authors persist in calling the principal points "nodal" points, a confusion of language which will puzzle students if when they come to the eye they discover that the nodal points of that organ are not the same as the principal points. There are good discussions of the subjects of angle of view, inequality of illumination and "depth of focus." We are glad to see that the authors have summoned up courage to omit "indigo" from the tints of the spectrum. It has long been recognised that there is no indigo tint between the blue and the violet. It is a pity that the authors admit the vulgarism in chapter iv. of writing the aperture-ratios $f/24$, $f/16$, &c., as $f24$, $f16$, &c. On p. 49 they give the notation correctly. The lens diagrams would be improved by cross-hatching the sections of the lenses; it is impossible by looking at the mere outline, for example, of the composite back lens of Fig. 104A, on p. 91, to tell whether it represents three lenses cemented together or two lenses separated by an air-space. The practical hints on focussing, copying and enlarging are excellent; and we quite concur in the advice on p. 95 to avoid second-hand lenses. Some admirable examples of the performance of lenses are reproduced in half-tone blocks. That of King Henry VII.'s Chapel on p. 171 is really marvellous.

A Text-book of Geology. By Albert Perry Brigham, A.M., F.G.S.A., Professor of Geology in Colgate University. Pp. 477; illustrated. (London: Hirschfeld Brothers, Ltd., 1902.)

ALTHOUGH this work bears on its title-page the name of a London publisher, it is evidently prepared with a view to the requirements of teachers and students in the United States. It forms one of the "Twentieth Century Text-books" edited by Dr. A. F. Nightingale, formerly of Chicago. According to its author's preface, this text-book has been especially prepared as an elementary treatise for secondary schools in America, and it seems admirably adapted for this purpose. While modestly disclaiming any great originality in the plan of the work or novelty in the mode of treatment of geological problems, the author may be

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congratulated upon having produced a very clear and readable introduction to the study of geology. The illustrations, many of which are new, are especially excellent, some being from original photographs taken by the author during his travels.

It is only fair to add, however, that while the earlier chapters may be read with advantage by all students of the science in every part of the globe, the part of the book which deals with "historical" or stratigraphical geology is quite unsuited for European students. The sequence of formation described is that of the American continent, and the fossils figured are, almost without exception, American forms. This, while fitting the work for students on the other side of the Atlantic, makes the work of little value, so far as its later chapters go, to English readers.

Elementary Plant Physiology. By D. T. Macdougal Ph.D. Pp. xi + 138. (New York and London: Longmans, Green and Co., 1902.) Price 3*s.* net.

WITHIN the pages of his elementary text-book Prof. Macdougal has collected together a very large number of experiments—so large, indeed, that forty-eight laboratory periods do not by any means exhaust the list. A certain number of these would be included in an ordinary anatomical course, *e.g.* the examination of sections of various parts of the plant, of mycorhiza, &c., while others are merely bionomical observations. The inclusion of these, however, is not so much deprecated, but rather the scant treatment which is meted out to some of the more important activities of the plant. Respiration is practically limited to a few experiments with seeds placed in a retort inverted over mercury; such apparatus precludes any but the roughest quantitative measurement. Again, no practical form of potometer is suggested, and absolutely no mention is made of the movement of protoplasm. Apart from the actual study of the movement, the streaming of protoplasm affords a simple indicator when investigating the action of anæsthetics or of neutral or poisonous gases upon the plant. These inhibiting effects are worked in by the author with growth, and this makes the experiments more complicated and less adapted to measurement.

These omissions are the more disappointing because Prof. Macdougal has the happy knack of giving explicit and full directions in a few sentences, and, further, he takes every opportunity of throwing out suggestions which should lead the student to think for himself and thereby obtain a fuller appreciation of the problems with which he is dealing.

Diagramme der electrischen und magnetischen Zustände und Bewegungen. By F. W. Wüllenweber. Pp. 64 + plates. (Leipzig: J. A. Barth, 1901.)

THIS book, consisting of ten plates and sixty diagrams and descriptive text, is put forward by the author as a contribution to the answers to the questions, What is electricity? and What is magnetism? The diagrams consist of figures representing the lines of force due to various distributions of electricity or magnetism; but in no case is there any quantitative representation attempted. All that we are given is a distribution of arrow heads representing the direction of the ether strains on a molecule. The diagrams being purely qualitative, there is really nothing in the book that a student could not put down himself easily, and frequently with greater accuracy than the author. The conception of lines and tubes of force as treated by Maxwell and Thomson can be most useful and instructive, but as they are given in the present book they can only result in confusion. We are afraid the questions What is electricity? and What is magnetism? are no more nearly answered after the appearance of this book than before.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

A Remarkable Solar Halo.

ON Sunday, August 7, 1898, being in Norway, I was climbing, with a friend, the upper slopes of the Horntind, above Skogstad, in the well-known Valders route between Christiania and Laerdal, lat. 61° 15′ 30″, long. exactly 6° E. We had reached a height of about 4000 feet above sea level when we saw the very remarkable halo of which I send you the photograph of the copy of a very careful drawing, made on the spot. I first caught site of the halo at 11.30 a.m., on lying down for a short rest on a large flat horizontal stone, but I have no reason to doubt that it had been visible for some time before. The early morning had been brilliantly fine, the air still, and the sun very hot; about 10.30 a.m. a very light breeze from almost due south began to blow, with intervals of dead calm. When the halo was seen, the sky was completely covered with a thin white haze. There was, however, no rain that day, though the weather on the next and succeeding days was not good. The sky outside the circles seemed everywhere brighter than inside them; the sun shone through the haze scarcely brightly enough to throw a distinct shadow, and his rays aroused no sensation of warmth. The inner edge of all the rings was fairly sharp, and of an orange-red colour, brightening into yellow, which grew paler towards the outer rim, where it faded into a bluish-white radiance, which in turn became imperceptibly blended with the white misty sky. The width of the rings was from one-and-a-half to two degrees.

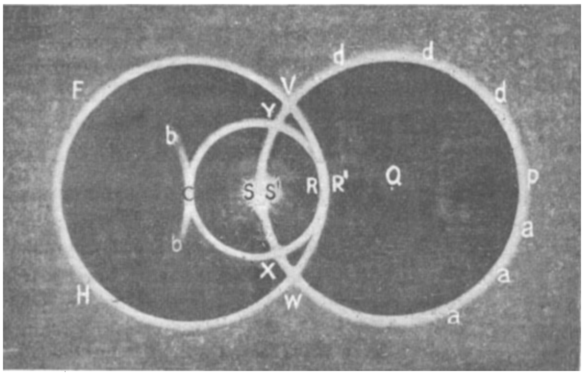

FIG. 1.

I watched the halo until it had completely faded. First the ring SVPW faded, the other two complete circles remaining visible after it had completely disappeared. Next the ring FHWV slowly vanished, leaving the small ring CYRX quite perfect and bright, and also the luminosity at *bb*. This last looked like a small part of a fourth circle; certainly it was curved and convex towards the sun, but of what radius this small arc was I am uncertain, but suspect that it was either the same, or greater than, the radius of the two big circles. I had no accurate instrument with me at the time for measuring angles, but the disc of the sun was distinctly visible through my neutral-tinted snow glasses, and in estimating the distance S R as subtending at the eye an angle of 19° I do not think there is an error of more than a few minutes of angle. The radius of each of the big circles must have been, therefore, nearly 44°, and that of the small circle about 22°.

In the illustration, the width of the rings is somewhat exaggerated. But by far the most remarkable thing about this halo is the asymmetric position of the sun with respect to the rings. With respect to the two large circles this is obvious, for the sun appeared to lie on the circumference of one of them, and at a point half way (subject to what is said below) between the centre and the circumference of the other; but, besides this, I could not persuade myself, though I exerted all my powers of

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